



- ☐ Tentative Specification
- ☐ Preliminary Specification
- ☒ Approval Specification

MODEL NO.: V236H1
SUFFIX: L03

Customer:

APPROVED BY

SIGNATURE

Name / Title _____

Note

Please return 1 copy for your confirmation with your signature and comments.

Approved By	Checked By	Prepared By
Chao-Chun Chung	Roger Huang	Bowei Huang

**CONTENTS**

1. GENERAL DESCRIPTION.....	5
1.1 OVERVIEW	5
1.2 FEATURES	5
1.3 APPLICATION.....	5
1.4 GENERAL SPECIFICATIONS	5
1.5 MECHANICAL SPECIFICATIONS	6
2. ABSOLUTE MAXIMUM RATINGS	7
2.1 ABSOLUTE RATINGS OF ENVIRONMENT.....	7
2.2 PACKAGE STORAGE	8
2.3 ELECTRICAL ABSOLUTE RATINGS.....	8
2.3.1 TFT LCD MODULE.....	8
2.3.2 BACKLIGHT UNIT	8
3. ELECTRICAL CHARACTERISTICS	9
3.1 TFT LCD MODULE.....	9
3.2 BACKLIGHT CONNECTOR PIN CONFIGURATION.....	11
3.2.1 LAMP SPECIFICATION.....	11
4. BLOCK DIAGRAM OF INTERFACE	13
4.1 TFT LCD MODULE.....	13
4.2 BACKLIGHT UNIT.....	13
5. INPUT TERMINAL PIN ASSIGNMENT	14
5.1 TFT LCD Module Input	14
5.2 BACKLIGHT UNIT.....	15
5.3 BLOCK DIAGRAM OF INTERFACE	16
5.4 LVDS INTERFACE	18
5.5 COLOR DATA INPUT ASSIGNMENT.....	19
6. INTERFACE TIMING.....	20
6.1 INPUT SIGNAL TIMING SPECIFICATIONS.....	20
6.2 POWER ON/OFF SEQUENCE.....	22
7. OPTICAL CHARACTERISTICS	23
7.1 TEST CONDITIONS.....	23
7.2 OPTICAL SPECIFICATIONS	24



8. PRECAUTIONS	28
8.1 ASSEMBLY AND HANDLING PRECAUTIONS	28
8.2 SAFETY PRECAUTIONS	28
8.3 SAFETY STANDARDS	28
9. DEFINITION OF LABELS	29
9.1 CMI MODULE LABEL	29
10. PACKAGING	30
10.1 PACKAGING SPECIFICATIONS	30
10.2 PACKAGING METHOD	30
11. MECHANICAL CHARACTERISTIC	32

**REVISION HISTORY**

Version	Date	Page(New)	Section	Description
Ver. 2.0	Jun. 03, 2011	All	All	The Approved specification was first issued.
www.panelook.com				

**1. GENERAL DESCRIPTION****1.1 OVERVIEW**

V236H1-L03 is a 23.6" TFT Liquid Crystal Display module with 2 U-type CCFL Backlight unit and 30 pins 2ch-LVDS interface. This module supports 1920 x 1080 Full HDTV format and can display 16.7M (6 bit+Hi-FRC) colors. The inverter module for backlight isn't built-in.

1.2 FEATURES

- Extra-wide viewing angle.
- High contrast ratio.
- Fast response time.
- High color saturation.
- Full HD (1920 x 1080 pixels) resolution.
- DE (Data Enable) only mode.
- LVDS (Low Voltage Differential Signaling) interface.
- RoHS compliance.

1.3 APPLICATION

- Standard Living Room TVs
- MFM Application

1.4 GENERAL SPECIFICATIONS

Item	Specification	Unit	Note
Active Area	521.28H) x 293.22(V) (23.547" diagonal)	mm	(1)
Bezel Opening Area	525.22 (H) x 297.22 (V)	mm	
Driver Element	a-si TFT active matrix	-	-
Pixel Number	1920 x R.G.B. x 1080	pixel	-
Pixel Pitch	0.2715(H) x 0.2715(V)	mm	-
Pixel Arrangement	RGB vertical stripe	-	-
Power consumption	32.1W (LVDS input Power 5.1W + CCFL Backlight Power 27 W)	Watt	(2)
Display Colors	16.7M (6 bit+Hi-FRC)	color	-
Display Operation Mode	Transmissive mode / Normally white	-	-
Surface Treatment	Anti-Glare coating (Haze 25%)	-	(3)

Note (1) Please refer to the attached drawings in chapter 9 for more information about the front and back outlines.

Note (2) Please refer sec 3.1 and 3.2 for more information of Power consumption

Note (3) The spec. of the surface treatment is temporarily for this phase. CMI reserves the rights to change this feature.

**1.5 MECHANICAL SPECIFICATIONS**

Item		Min.	Typ.	Max.	Unit	Note
Module Size	Horizontal (H)	543.8	544.8	545.8	mm	(1)
	Vertical (V)	319.5	320.5	321.5	mm	(1)
	Depth (D)	45.7	46.7	47.7	mm	To Rear
	Depth (D)	50.7	51.7	52.7	mm	To Boss
Weight		-	2400	-	g	-

Note (1) Please refer to the attached drawings for more information of front and back outline dimensions.

**2. ABSOLUTE MAXIMUM RATINGS****2.1 ABSOLUTE RATINGS OF ENVIRONMENT**

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Storage Temperature	TST	-20	+60	°C	(1)
Operating Ambient Temperature	TOP	0	50	°C	(1), (2)
Shock (Non-Operating)	SNOP	-	50	G	(3), (5)
Vibration (Non-Operating)	VNOP	-	1.0	G	(4), (5)

Note (1) Temperature and relative humidity range is shown in the figure below.

(a) 90 %RH Max. ($T_a \leq 40$ °C).

(b) Wet-bulb temperature should be 39 °C Max. ($T_a > 40$ °C).

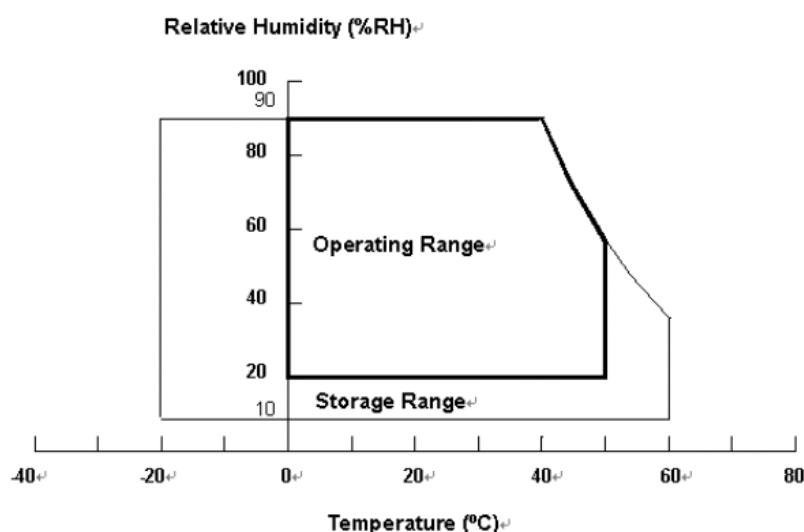
(c) No condensation.

Note (2) The maximum operating temperature is based on the test condition that the surface temperature of display area is less than or equal to 65 °C with LCD module alone in a temperature controlled chamber. Thermal management should be considered in final product design to prevent the surface temperature of display area from being over 65 °C. The range of operating temperature may degrade in case of improper thermal management in final product design.

Note (3) 11 ms, half sine wave, 1 time for $\pm X$, $\pm Y$, $\pm Z$.

Note (4) 10 ~ 200 Hz, 10 min, 1 time each X, Y, Z.

Note (5) At testing Vibration and Shock, the fixture in holding the module has to be hard and rigid enough so that the module would not be twisted or bent by the fixture.



2.2 PACKAGE STORAGE

When storing modules as spares for a long time, the following precaution is necessary.

- (a) Do not leave the module in high temperature, and high humidity for a long time, It is highly recommended to store the module with temperature from 0 to 35 °C at normal humidity without condensation.
- (b) The module shall be stored in dark place. Do not store the TFT-LCD module in direct sunlight or fluorescent light.

2.3 ELECTRICAL ABSOLUTE RATINGS**2.3.1 TFT LCD MODULE**

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Power Supply Voltage	V _{CC}	-0.3	+6	V	(1)
Logic Input Voltage	V _{IN}	-0.3	3.6	V	

2.3.2 BACKLIGHT UNIT

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Lamp Voltage	V _L	981	1188	V _{RMS}	
Power Supply Voltage	V _{BL}	0	30	V	(1)
Control Signal Level	—	-0.3	7	V	(1), (3)

Note (1) Permanent damage to the device may occur if maximum values are exceeded. Function operation should be restricted to the conditions described under Normal Operating Conditions.

Note (2) No moisture condensation or freezing.

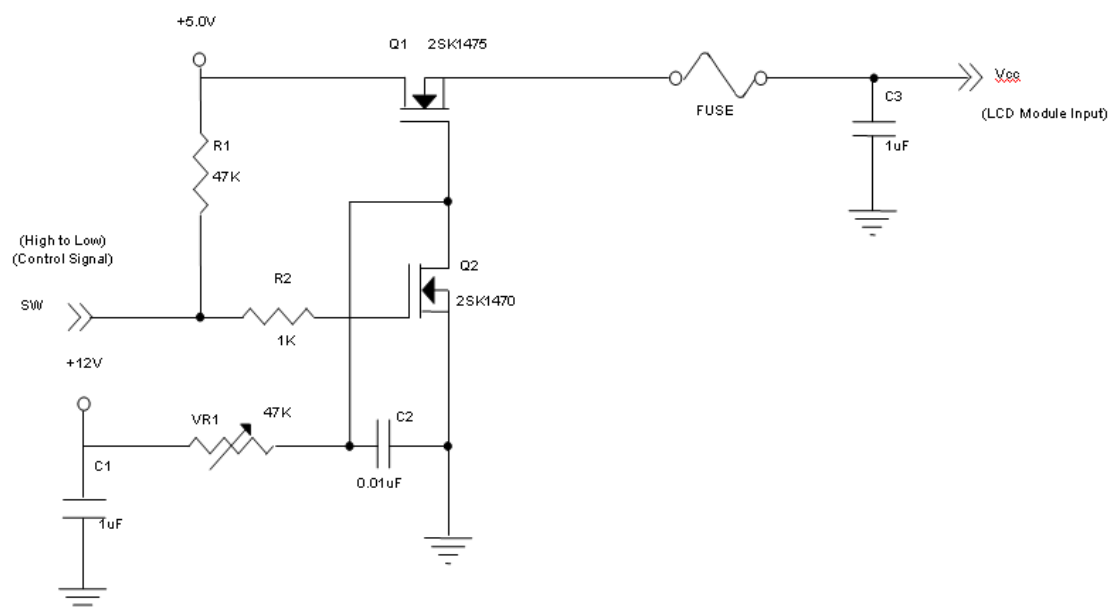
Note (3) The control signals include On/Off Control & E-PWM.

3. ELECTRICAL CHARACTERISTICS**3.1 TFT LCD MODULE**

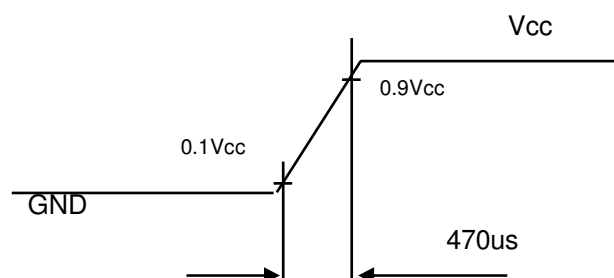
(Ta = 25 ± 2 °C)

Parameter		Symbol	Value			Unit	Note
			Min.	Typ.	Max.		
Power Supply Voltage		V _{CC}	4.5	5.0	5.5	V	(1)
Rush Current		I _{RUSH}	—	—	3	A	(2)
Power Consumption		P _T	—	5.1	6.45	W	(3)
Power Supply Current	White Pattern	—	—	0.4	0.55	A	(4)
	Vertical Stripe	—	—	0.96	1.29	A	
	Black Pattern	—	—	1.02	1.29	A	
LVDS interface	Differential Input High Threshold Voltage	V _{LVTH}	+100	—	—	mV	(5)
	Differential Input Low Threshold Voltage	V _{LVTL}	—	—	-100	mV	
	Common Input Voltage	V _{CM}	1.0	1.2	1.4	V	
	Differential input voltage (single-end)	V _{ID}	200	—	600	mV	

Note (1) The module should be always operated within the above ranges.



Vcc rising time is 470us



Note (3) The Specified Power consumption is under Vertical Stripe pattern.

Note (4) The specified power supply current is under the conditions at $V_{cc} = 12\text{ V}$, $T_a = 25 \pm 2\text{ }^{\circ}\text{C}$, $f_v = 60\text{ Hz}$, whereas a power dissipation check pattern below is displayed.

a. White Pattern



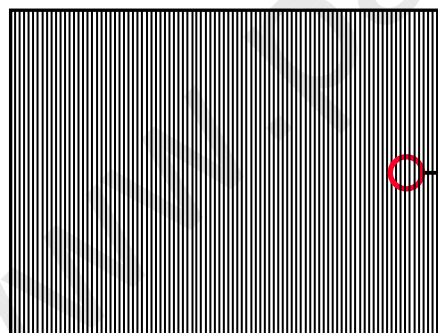
Active Area

b. Black Pattern

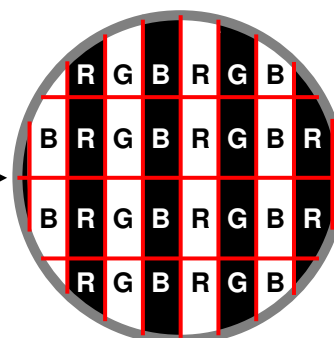


Active Area

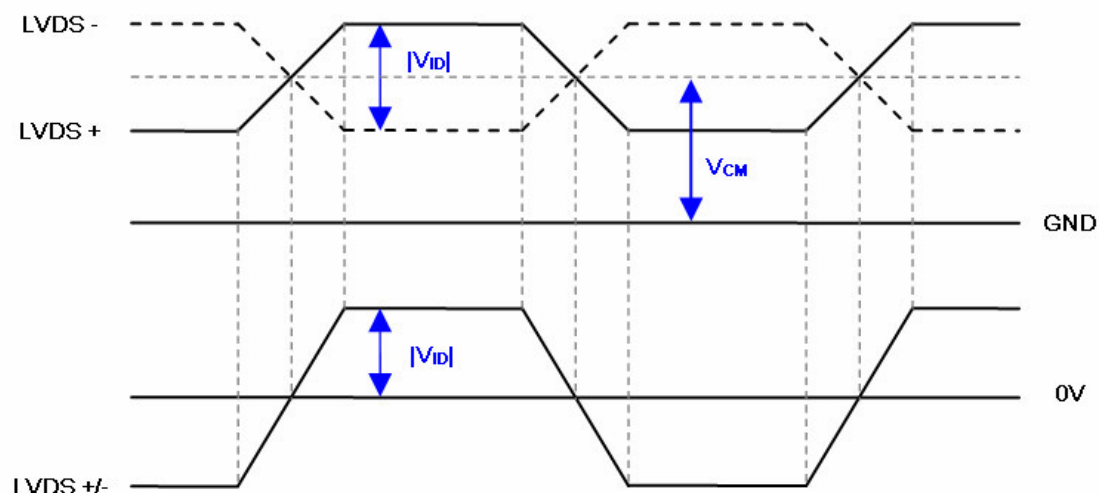
c. Vertical Stripe Pattern



Active Area



Note (5) The LVDS input characteristics are as follows :



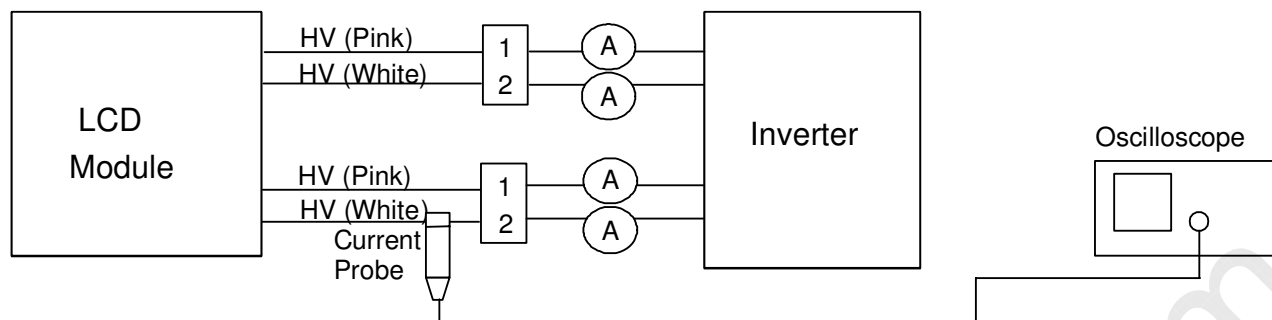
3.2 BACKLIGHT CONNECTOR PIN CONFIGURATION

3.2.1 LAMP SPECIFICATION

($T_a = 25 \pm 2 \text{ } ^\circ\text{C}$)

Parameter	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
Lamp Input Voltage	V_L	981	1080	1188	V_{RMS}	$I_L=12.5\text{mA}$
Lamp Current	I_L	12.0	12.5	13.0	mA_{RMS}	
Lamp Turn On Voltage	V_S	-	-	1910	V_{RMS}	(1) , $T_a = 0 \text{ } ^\circ\text{C}$
		-	-	1730	V_{RMS}	(1) , $T_a = 25 \text{ } ^\circ\text{C}$
Operating Frequency	F_O	30	-	80	KHz	(2)
Lamp Life Time	L_{BL}	50,000	-	-	Hrs	(3)
Power Consumption	P_{BL}	-	27	-	W	

Note (1) Lamp current is measured by AC current probe & oscilloscope as shown below:



Measure equipment:

AC Current probe: Tektronix P6022

Oscilloscope: TDS3054B

$T_a = 25 \pm 2 \text{ }^{\circ}\text{C}$

Note (2) The lamp starting voltage V_s should be applied to the lamp for more than 1 second after startup.

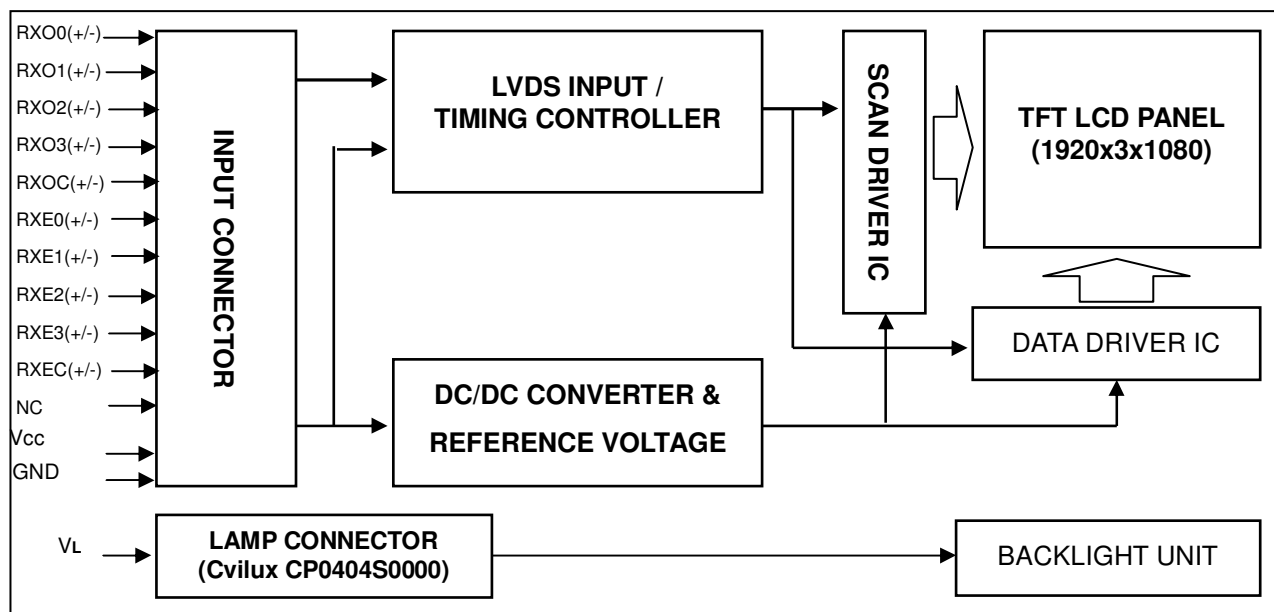
Otherwise the lamp may not be turned on.

Note (3) The lamp frequency may produce interference with horizontal synchronous frequency of the display input signals, and it may result in line flow on the display. In order to avoid interference, the lamp frequency should be detached from the horizontal synchronous frequency and its harmonics as far as possible.

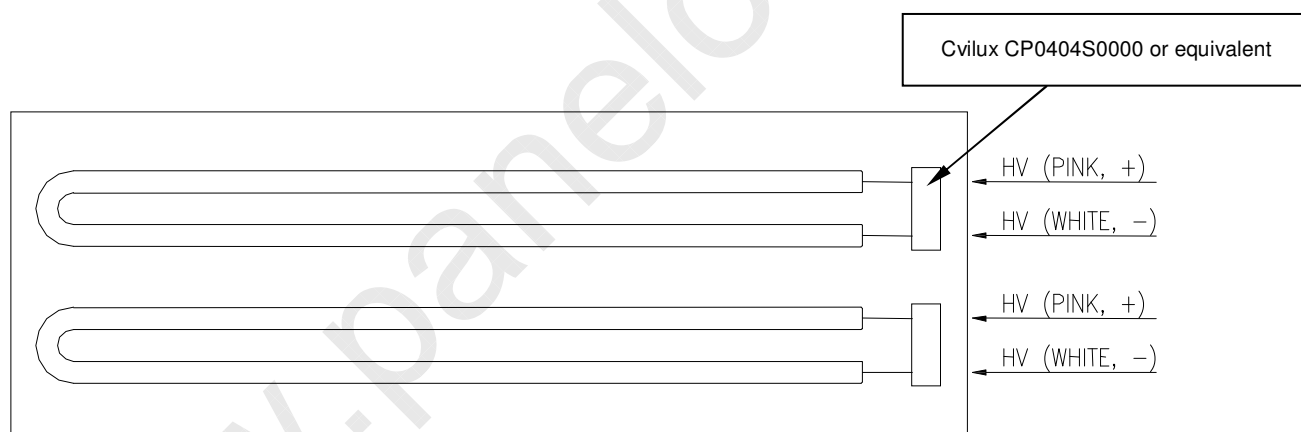
Note (4) The life time of a lamp is defined as when the brightness is larger than 50% of its original value and the effective discharge length is longer than 80% of its original length (Effective discharge length is defined as an area that has equal to or more than 70% brightness compared to the brightness at the center point of lamp.) as the time in which it continues to operate under the condition at $T_a = 25 \pm 2^{\circ}\text{C}$ and $I_L = 12.0 \sim 13.0 \text{ mA}_{\text{rms}}$.

4. BLOCK DIAGRAM OF INTERFACE

4.1 TFT LCD MODULE



4.2 BACKLIGHT UNIT



Note: On the same side, the same polarity lamp voltage design for lamps is recommended.

**5. INPUT TERMINAL PIN ASSIGNMENT****5.1 TFT LCD Module Input**

Pin	Name	Description
1	RXO0-	Negative LVDS differential data input. Channel O0 (odd)
2	RXO0+	Positive LVDS differential data input. Channel O0 (odd)
3	RXO1-	Negative LVDS differential data input. Channel O1 (odd)
4	RXO1+	Positive LVDS differential data input. Channel O1 (odd)
5	RXO2-	Negative LVDS differential data input. Channel O2 (odd)
6	RXO2+	Positive LVDS differential data input. Channel O2 (odd)
7	GND	Ground
8	RXOC-	Negative LVDS differential clock input. (odd)
9	RXOC+	Positive LVDS differential clock input. (odd)
10	RXO3-	Negative LVDS differential data input. Channel O3(odd)
11	RXO3+	Positive LVDS differential data input. Channel O3 (odd)
12	RXE0-	Negative LVDS differential data input. Channel E0 (even)
13	RXE0+	Positive LVDS differential data input. Channel E0 (even)
14	GND	Ground
15	RXE1-	Negative LVDS differential data input. Channel E1 (even)
16	RXE1+	Positive LVDS differential data input. Channel E1 (even)
17	GND	Ground
18	RXE2-	Negative LVDS differential data input. Channel E2 (even)
19	RXE2+	Positive LVDS differential data input. Channel E2 (even)
20	RXEC-	Negative LVDS differential clock input. (even)
21	RXEC+	Positive LVDS differential clock input. (even)
22	RXE3-	Negative LVDS differential data input. Channel E3 (even)
23	RXE3+	Positive LVDS differential data input. Channel E3 (even)
24	GND	Ground
25	NC	For LCD internal use only, Do not connect
26	NC	For LCD internal use only, Do not connect
27	NC	For LCD internal use only, Do not connect
28	VCC	+5.0V power supply
29	VCC	+5.0V power supply
30	VCC	+5.0V power supply

Note (1) Connector Part No.: GS23301-1321S-7H (FOXCONN) or 187053-30091 (P-TWO) or equivalent

Note (2) User's connector Part No:

Mating Wire Cable Connector Part No.: FI-X30H(JAE) or FI-X30HL(JAE)

Note (3) The first pixel is odd.

Note (4) Input signal of even and odd clock should be the same timing.

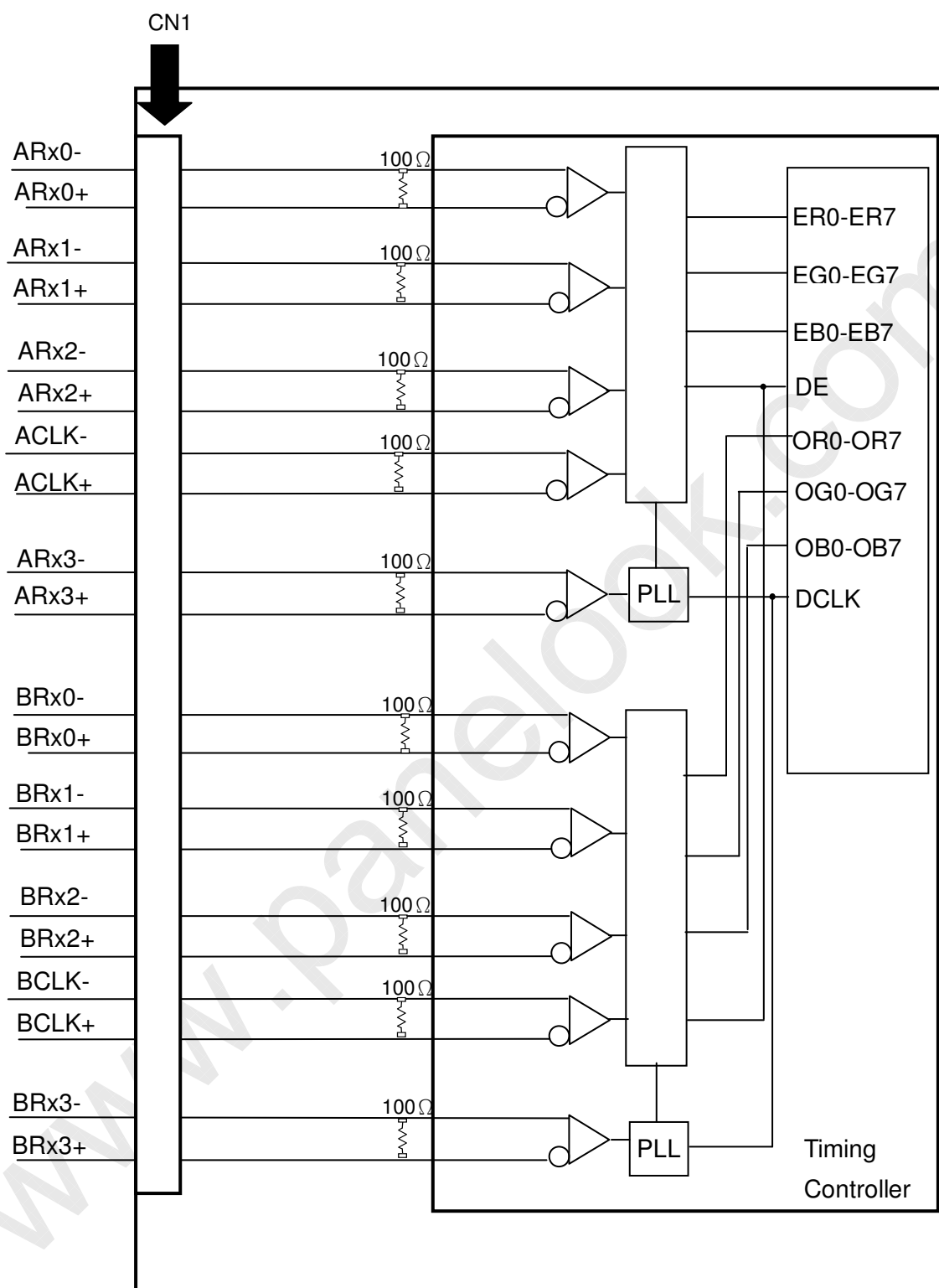
**5.2 BACKLIGHT UNIT**

The pin configuration for the housing and the leader wire is shown in the table below.

Pin	Symbol	Description	Remark
1-1	HV	High Voltage	Pink
1-2	HV	High Voltage	White
2-3	HV	High Voltage	Pink
2-4	HV	High Voltage	White

Note (1) Connector Part No.: Cvilux CP0404S0000 or equivalent

5.3 BLOCK DIAGRAM OF INTERFACE





ER0~ER7	Even pixel R data	OR0~OR7	Odd pixel R data
EG0~EG7	Even pixel G data	OG0~OG7	Odd pixel G data
EB0~EB7	Even pixel B data	OB0~OB7	Odd pixel B data
		DE	Data enable signal
		DCLK	Data clock signal

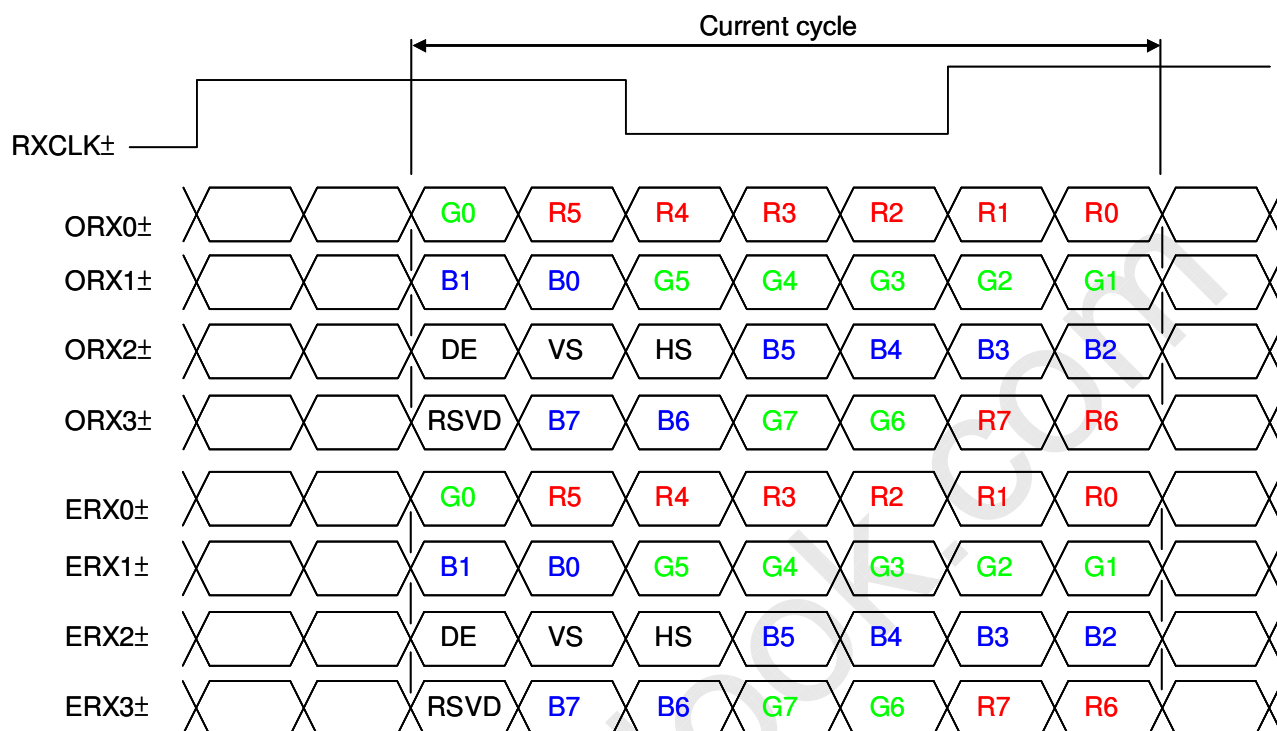
Note (1) The system must have the transmitter to drive the module.

Note (2) LVDS cable impedance shall be 50 ohms per signal line or about 100 ohms per twist-pair line when it is used differentially.

Note (3) Two pixel data send into the module for every clock cycle. The first pixel of the frame is odd pixel and the second pixel is even pixel.

5.4 LVDS INTERFACE

VESA Format



R0~R7: Pixel R Data (7; MSB, 0; LSB)

G0~G7: Pixel G Data (7; MSB, 0; LSB)

B0~B7: Pixel B Data (7; MSB, 0; LSB)

DE : Data enable signal

DCLK : Data clock signal

Notes (1) RSVD (reserved) pins on the transmitter shall be "H" or "L".



5.5 COLOR DATA INPUT ASSIGNMENT

The brightness of each primary color (red, green and blue) is based on the 8-bit gray scale data input for the color. The higher the binary input, the brighter the color. The table below provides the assignment of the color versus data input.

Color		Data Signal																							
		Red								Green								Blue							
		R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1	B0
Basic Colors	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Green	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Cyan	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Magenta	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Gray Scale Of Red	Red (0) / Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red (1)	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red (2)	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Red (253)	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red (254)	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red (255)	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gray Scale Of Green	Green (0) / Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Green (1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
	Green (2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Green (253)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0
	Green (254)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0
	Green (255)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
Gray Scale Of Blue	Blue (0) / Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Blue (1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Blue (2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Blue (253)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1
	Blue (254)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0
	Blue (255)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1

Note (1) 0: Low Level Voltage, 1: High Level Voltage

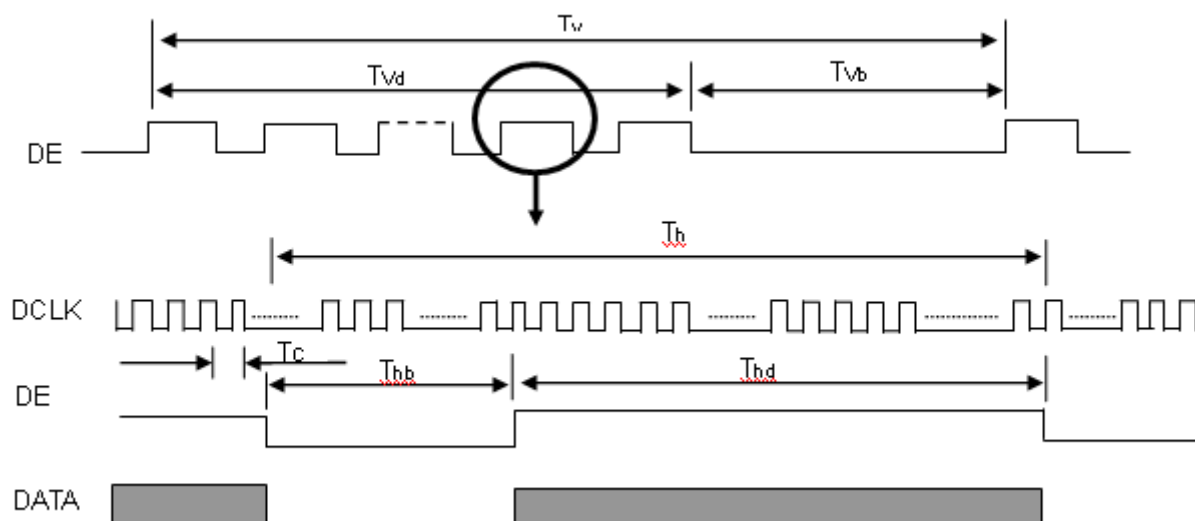
**6. INTERFACE TIMING****6.1 INPUT SIGNAL TIMING SPECIFICATIONS**

The input signal timing specifications are shown as the following table and timing diagram. ($T_a = 25 \pm 2\text{ }^{\circ}\text{C}$)

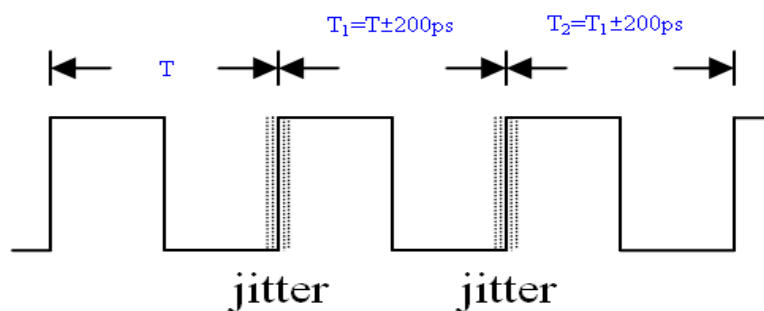
Signal	Item	Symbol	Min.	Typ.	Max.	Unit	Note
LVDS Receiver Clock	Frequency	$F_{\text{clkin}} (=1/TC)$	58.54	74.25	98	MHz	
	Period	T_c		13.47	-	ns	
	Input cycle to Cycle jitter	T_{rcl}	$-0.02 \cdot T_c$	-	$0.02 \cdot T_c$	ps	(2)
	Spread spectrum modulation range	$F_{\text{clkin_mod}}$	$0.97 \cdot F_{\text{clkin}}$	—	$1.03 \cdot F_{\text{clkin}}$	MHz	(3)
	Spread spectrum modulation frequency	F_{SSM}			200	KHz	
LVDS Receiver Data	Setup Time	T_{lvsu}	600	-	-	ps	
	Hold Time	T_{lvhd}	600	-	-	ps	
Vertical Active Display Term	Frame Rate	F_r	50	60	76	Hz	
	Total	T_v	1115	1125	1136	Th	$T_v = T_{\text{vd}} + T_{\text{vb}}$
	Display	T_{vd}	1080	1080	1080	Th	
	Blank	T_{vb}	35	45	56	Th	
Horizontal Active Display Term	Total	T_h	1050	1100	1150	Tc	$T_h = T_{\text{hd}} + T_{\text{hb}}$
	Display	T_{hd}	960	960	960	Tc	
	Blank	T_{hb}	90	140	190	Tc	

Note: Because this module is operated by DE only mode, Hsync and Vsync input signals are ignored.

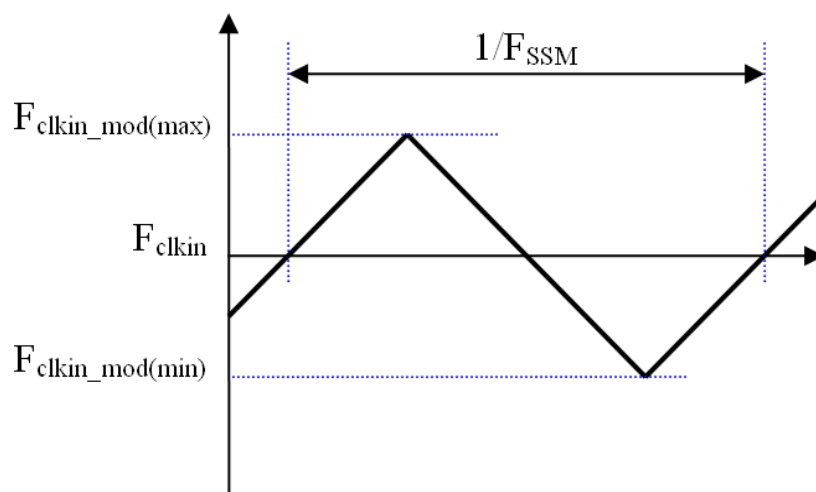
INPUT SIGNAL TIMING DIAGRAM



Note (2) The input clock cycle-to-cycle jitter is defined as below figures. $Trcl = |T_1 - T_1|$



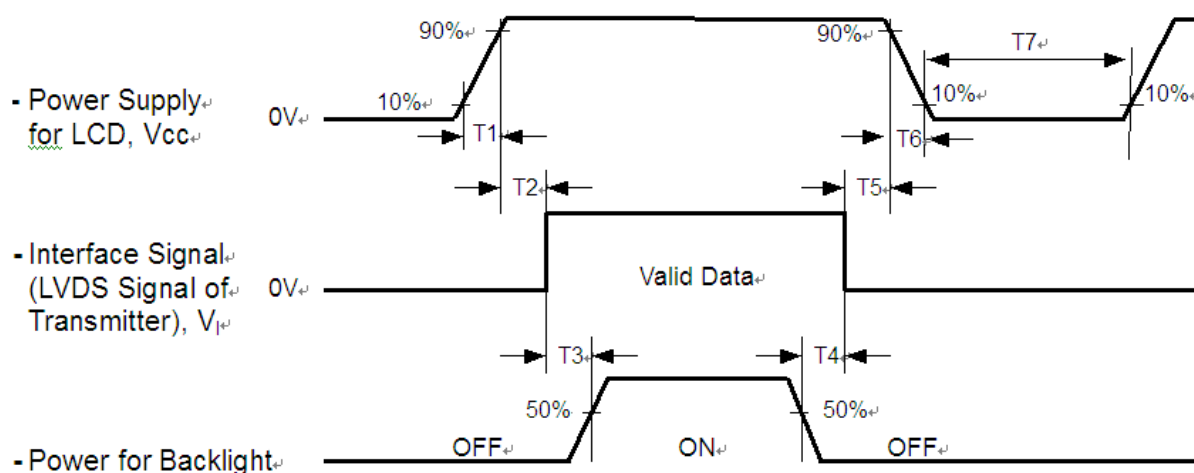
Note (3) The SSCG (Spread spectrum clock generator) is defined as below figures.



6.2 POWER ON/OFF SEQUENCE

(Ta = 25 ± 2 °C)

To prevent a latch-up or DC operation of LCD module, the power on/off sequence should be as the diagram below.



Timing Specifications:

Parameters	Values			Units
	Min	Typ.	Max	
T1	0.5	--	10	ms
T2	0	--	50	ms
T3	450	--	--	ms
T4	90	--	--	ms
T5	0	--	50	ms
T6	0.5	--	100	ms
T7	500	--	--	ms

Note (1) The supply voltage of the external system for the module input should be the same as the definition of Vcc.

Note (2) When the backlight turns on before the LCD operation of the LCD turns off, the display may momentarily become abnormal screen.

Note (3) In case of VCC = off level, please keep the level of input signals on the low or keep a high impedance.

Note (4) T7 should be measured after the module has been fully discharged between power off and on period.

Note (5) Interface signal shall not be kept at high impedance when the power is on.

Note (6) CMI won't take any responsibility for the products which are damaged by the customers not following the Power Sequence.

Note (7) There might be slight electronic noise when LCD is turned off (even backlight unit is also off). To avoid this symptom, we suggest "Vcc falling timing" to follow "T6 spec".

**7. OPTICAL CHARACTERISTICS****7.1 TEST CONDITIONS**

Item	Symbol	Value	Unit
Ambient Temperature	Ta	25±2	°C
Ambient Humidity	Ha	50±10	%RH
Supply Voltage	V _{CC}	5	V
Input Signal	According to typical value in "3. ELECTRICAL CHARACTERISTICS"		
Lamp Current	I _L	12.5±0.5	mA
Oscillating Frequency (Inverter)	F _L	58±3	KHz
Inverter	Logah F236H1-2UA-L001		

The LCD module should be stabilized at given temperature for 1 hour to avoid abrupt temperature change during measuring in a windless room.

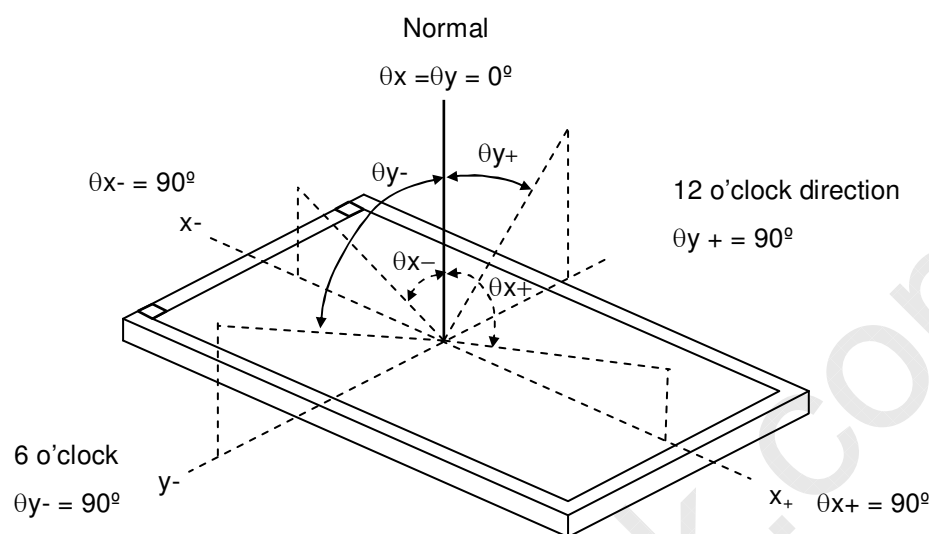
7.2 OPTICAL SPECIFICATIONS

The relative measurement methods of optical characteristics are shown in 7.2. The following items should be measured under the test conditions described in 7.1 and stable environment shown in 7.1.

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Contrast Ratio		CR	$\theta_x=0^\circ, \theta_y=0^\circ$ Viewing angle at normal direction	600	800	-	-	(2)
Response Time		T _R		-	1.5	2.5	ms	(3)
		T _F		-	3.5	7	ms	
Center Luminance of White		L _C		240	300	-	cd/m ²	(4)
White Variation		δW		-	-	1.33	-	(6)
Cross Talk		CT		-	-	4	%	(5)
Color Chromaticity	Red	R _x		Typ. -0.03	Typ. +0.03	-	-	
		R _y				-		
	Green	G _x				-		
		G _y				-		
	Blue	B _x				-		
		B _y				-		
	White	W _x				-		
		W _y				-		
	Color Gamut					C.G		-
Viewing Angle	Horizontal	θ _{x+} + θ _{x-}	CR ≥ 10 USB2000	150	170		Deg.	(1)
	Vertical	θ _{y++} θ _{y-}		140	160	-		
	Horizontal	θ _{x+} + θ _{x-}	CR ≥ 5 USB2000	160	178	-		
	Vertical	θ _{y++} θ _{y-}		150	170	-		

Note (1) Definition of Viewing Angle (θ_x , θ_y) :

Viewing angles are measured by Autronic Conoscope Cono-80



Note (2) Definition of Contrast Ratio (CR) :

The contrast ratio can be calculated by the following expression.

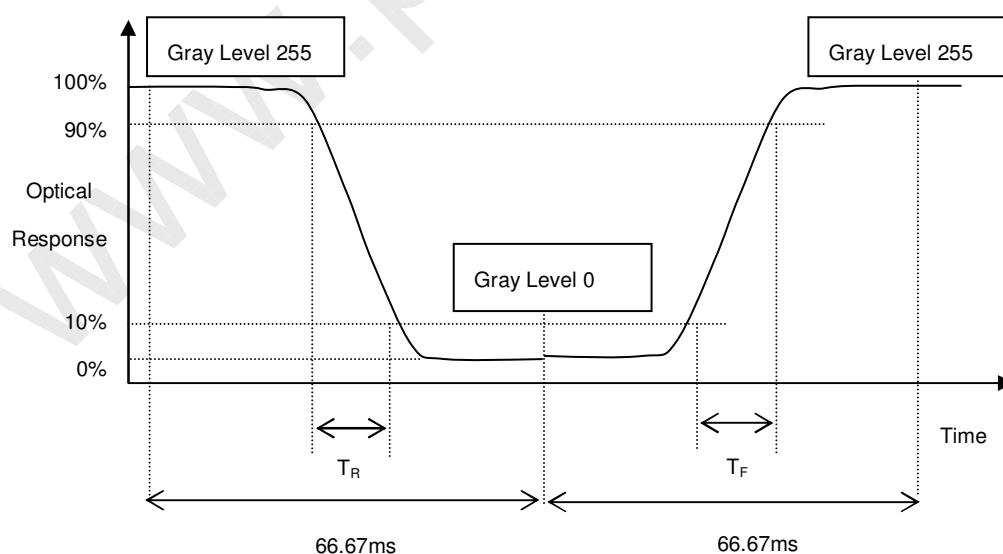
$$\text{Contrast Ratio (CR)} = \frac{\text{Surface Luminance of L255}}{\text{Surface Luminance of L0}}$$

L255: Luminance of gray level 255

L 0: Luminance of gray level 0

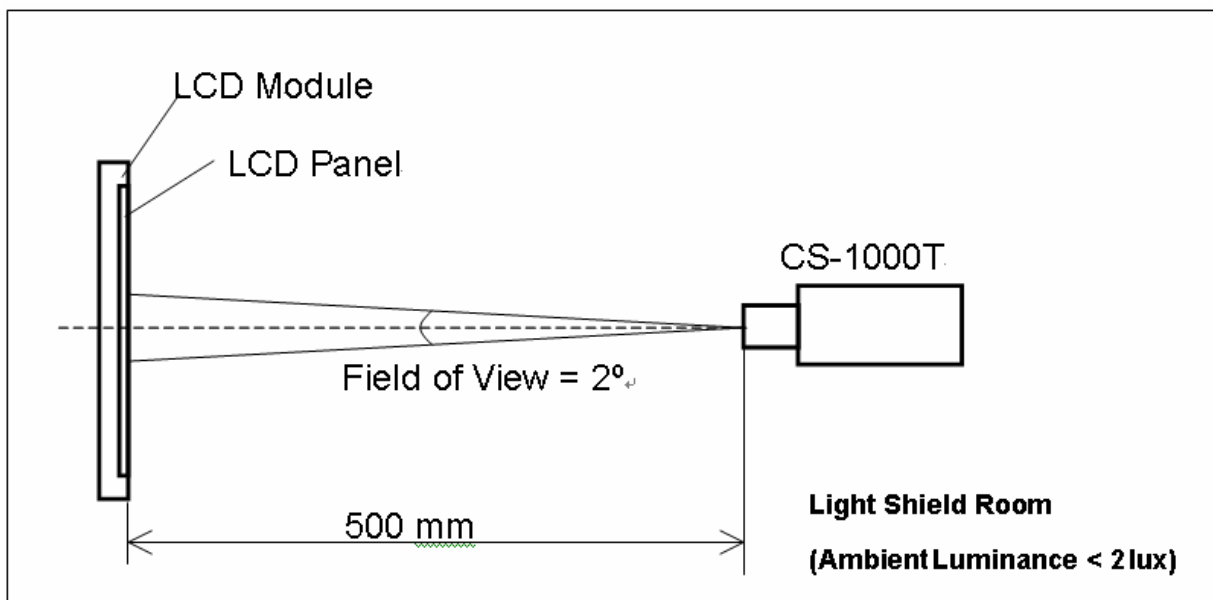
CR = CR (5), where CR (X) is corresponding to the Contrast Ratio of the point X at the figure in Note (6).

Note (3) Definition of Response Time (T_R , T_F):



Note (4) Measurement Setup:

The LCD module should be stabilized at given temperature for 1 hour to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting backlight for 1 hour in a windless room.



Note (5) Definition of Luminance of White (L_C , L_{AVE}):

Measure the luminance of gray level 255 at center point and 5 points

$L_C = L(5)$, where $L(X)$ is corresponding to the luminance of the point X at the figure in Note (6).

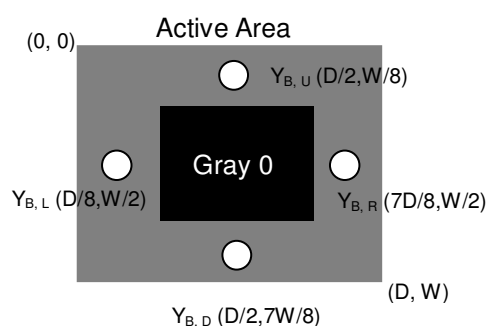
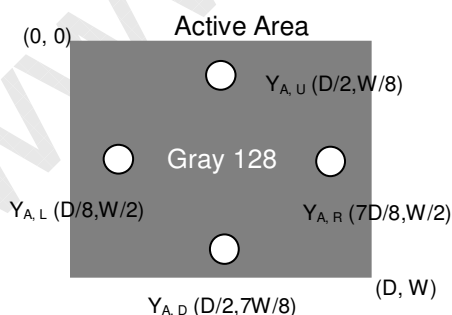
Note (6) Definition of Cross Talk (CT):

$$CT = |Y_B - Y_A| / Y_A \times 100 (\%)$$

Where:

Y_A = Luminance of measured location without gray level 0 pattern (cd/m²)

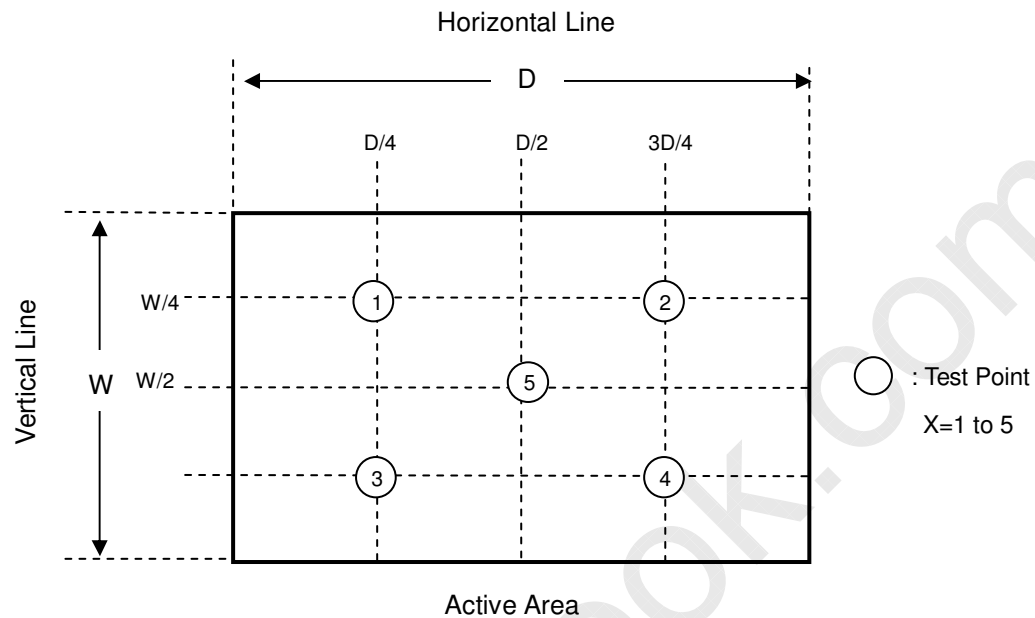
Y_B = Luminance of measured location with gray level 0 pattern (cd/m²)



Note (7) Definition of White Variation (δW):

Measure the luminance of gray level 255 at 5 points

$$\delta W = \text{Maximum [L (1), L (2), L (3), L (4), L (5)]} / \text{Minimum [L (1), L (2), L (3), L (4), L (5)]}$$



**8. PRECAUTIONS****8.1 ASSEMBLY AND HANDLING PRECAUTIONS**

- [1] Do not apply rough force such as bending or twisting to the module during assembly.
- [2] It is recommended to assemble or to install a module into the user's system in clean working areas. The dust and oil may cause electrical short or worsen the polarizer.
- [3] Do not apply pressure or impulse to the module to prevent the damage of LCD panel and Backlight.
- [4] Always follow the correct power-on sequence when the LCD module is turned on. This can prevent the damage and latch-up of the CMIS LSI chips.
- [5] Bezel of Set can not press or touch the panel surface. It will make light leakage or scrape.
- [6] Do not plug in or pull out the I/F connector while the module is in operation.
- [7] Do not disassemble the module.
- [8] Use a soft dry cloth without chemicals for cleaning, because the surface of polarizer is very soft and easily scratched.
- [9] Moisture can easily penetrate into LCD module and may cause the damage during operation.
- [10] When storing modules as spares for a long time, the following precaution is necessary.
 - [10.1] Do not leave the module in high temperature, and high humidity for a long time. It is highly recommended to store the module with temperature from 0 to 35°C at normal humidity without condensation.
 - [10.2] The module shall be stored in dark place. Do not store the TFT-LCD module in direct sunlight or fluorescent light.
- [11] When ambient temperature is lower than 10°C, the display quality might be reduced. For example, the response time will become slow, and the starting voltage of CCFL will be higher than that of room temperature.

8.2 SAFETY PRECAUTIONS

- [1] The startup voltage of a Backlight is approximately 1000 Volts. It may cause an electrical shock while assembling with the inverter. Do not disassemble the module or insert anything into the Backlight unit.
- [2] If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contact with hands, skin or clothes, it has to be washed away thoroughly with soap.
- [3] After the module's end of life, it is not harmful in case of normal operation and storage.

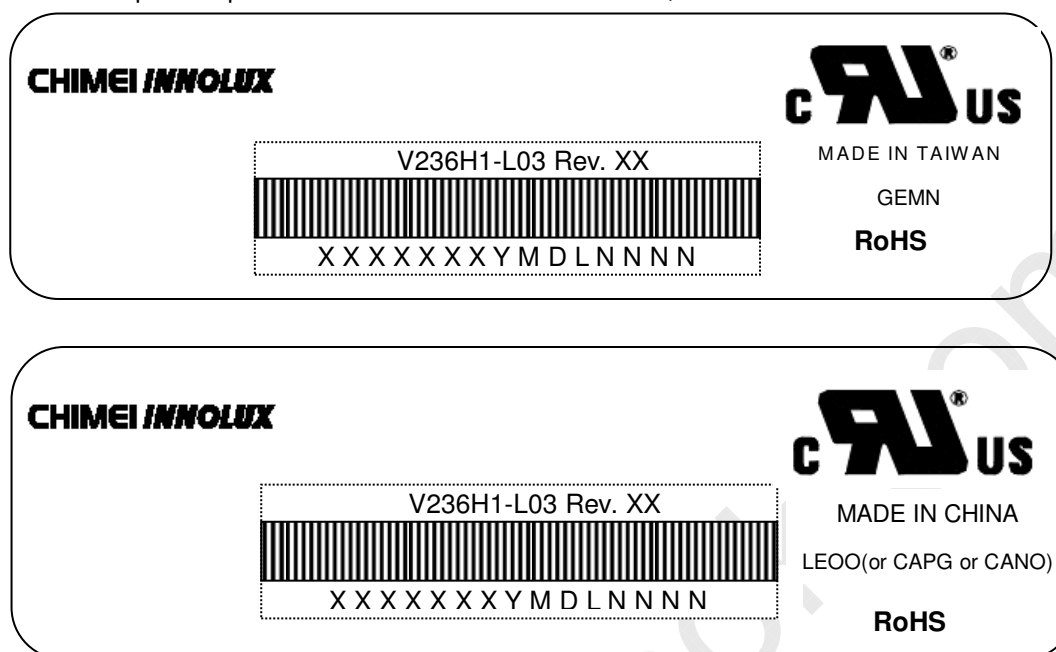
8.3 SAFETY STANDARDS

Requirement	Standard	remark
UL	UL60950-1:2006 or Ed.2:2007	
	UL60065 Ed.7:2007	
cUL/CSA	CAN/CSA C22.2 No.60950-1-03 or 60950-1-07	
	CAN/CSA C22.2 No.60065-03:2006 + A1:2006	
CB	IEC60950-1:2005 / EN60950-1:2006+ A11:2009	
	IEC60065:2001+ A1:2005 / EN60065:2002 + A1:2006 + A11:2008	

9. DEFINITION OF LABELS

9.1 CMI MODULE LABEL

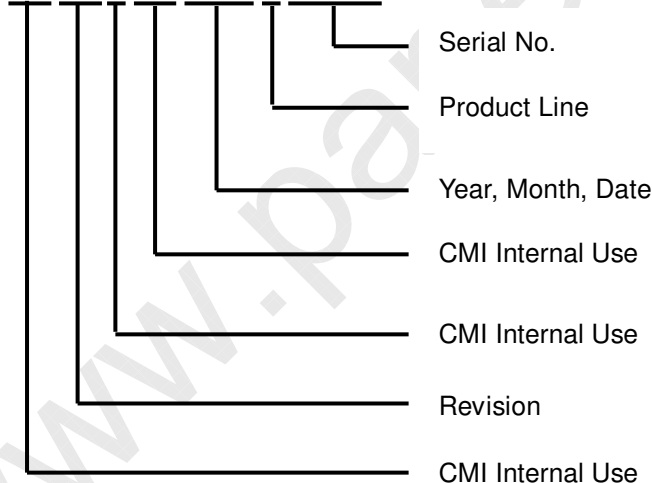
The barcode nameplate is pasted on each module as illustration, and its definitions are as following explanation.



Model Name: V236H1-L03

Revision: Rev. XX, for example: A0, A1... B1, B2... or C1, C2...etc.

Serial ID: XXXXXYYMDLNNNN



Serial ID includes the information as below:

Manufactured Date:

Year : 2001=1, 2002=2, 2003=3, 2004=4...2010=0, 2011=1, 2012=2...

Month: 1~9, A~C, for Jan. ~ Dec.

Day: 1~9, A~Y, for 1st to 31st, exclude I, O, and U.

Revision Code : Cover all the change

Serial No. : Manufacturing sequence of product

Product Line : 1 → Line1, 2 → Line 2, ...etc.

10. PACKAGING**10.1 PACKAGING SPECIFICATIONS**

- (1) 4 LCD TV modules / 1 Box
- (2) Box dimensions : 620(L) X 342 (W) X 390 (H) mm
- (3) Weight : Approx. 12.1 Kg (4 modules per box)

10.2 PACKAGING METHOD

- (1) Carton Packing should have no failure in the following reliability test items.

Test Item	Test Conditions	Note
Vibration	ISTA STANDARD Random, Frequency Range: 1 – 200 Hz Top & Bottom: 30 minutes (+Z), 10 min (-Z), Right & Left: 10 minutes (X) Back & Forth 10 minutes (Y)	Non Operation
Dropping Test	1 Corner, 3 Edge, 6 Face, 61cm	Non Operation

Figures 10-1 and 10-2 are the packing method

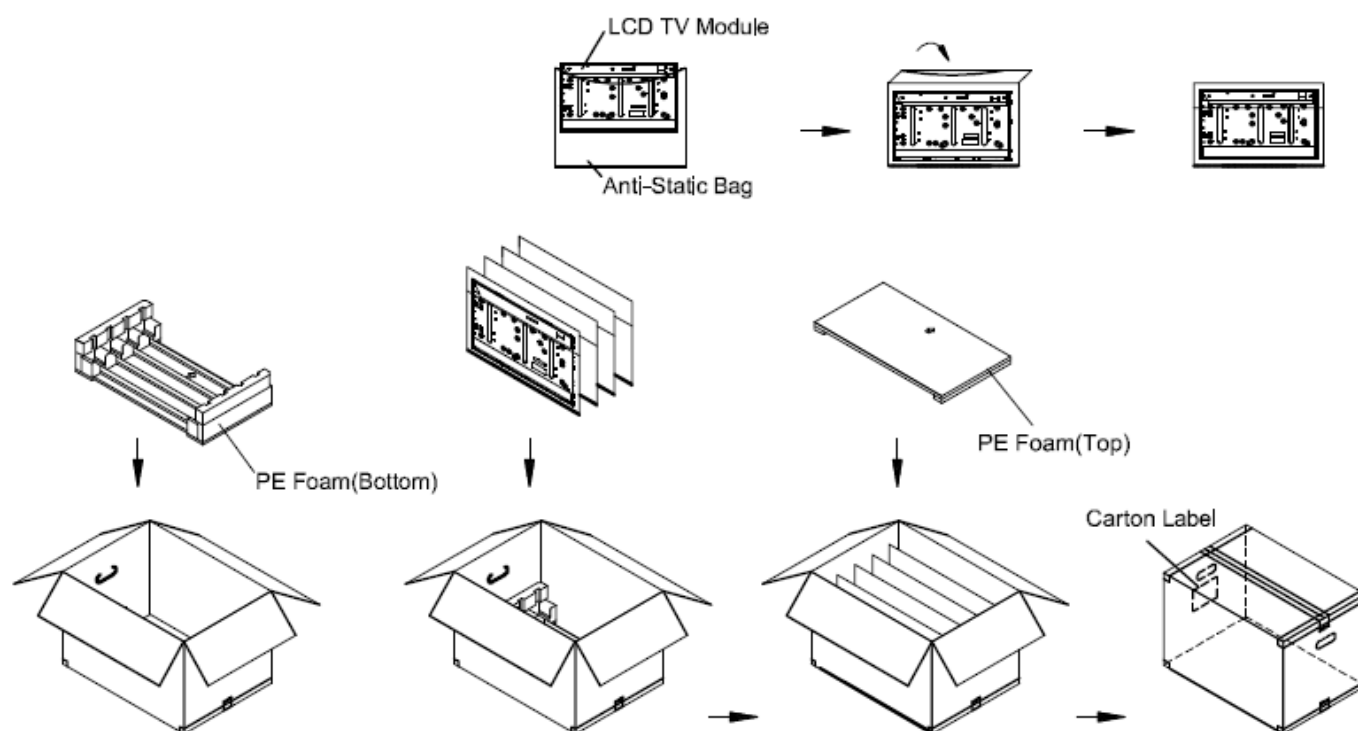
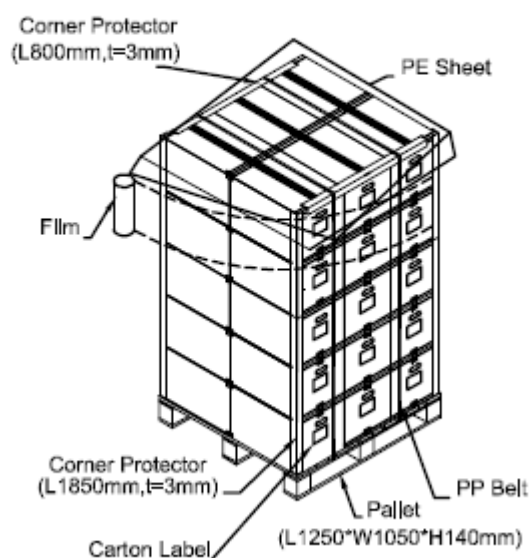


Figure 10-1 packing method

Sea / Land Transportation (40ft Container)



Air Transportation

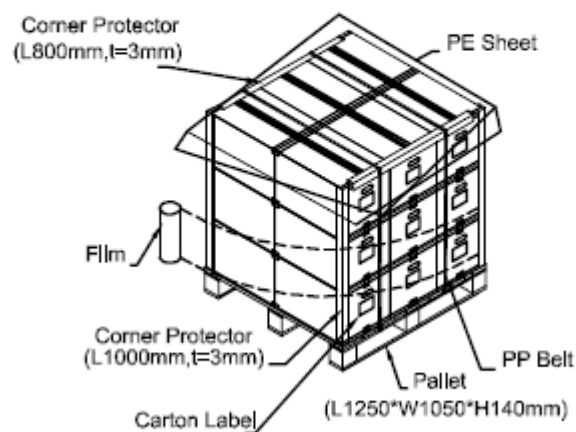
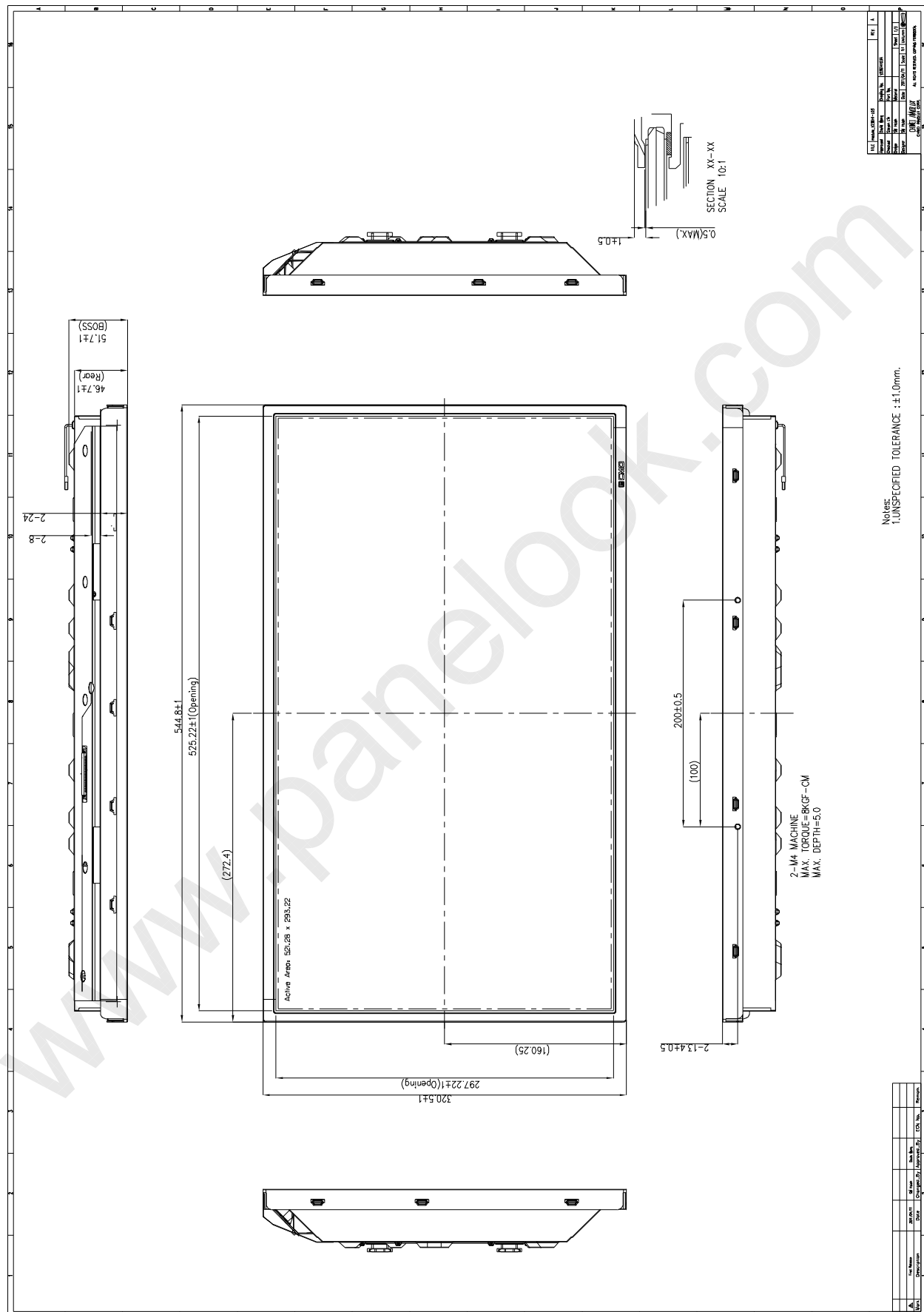


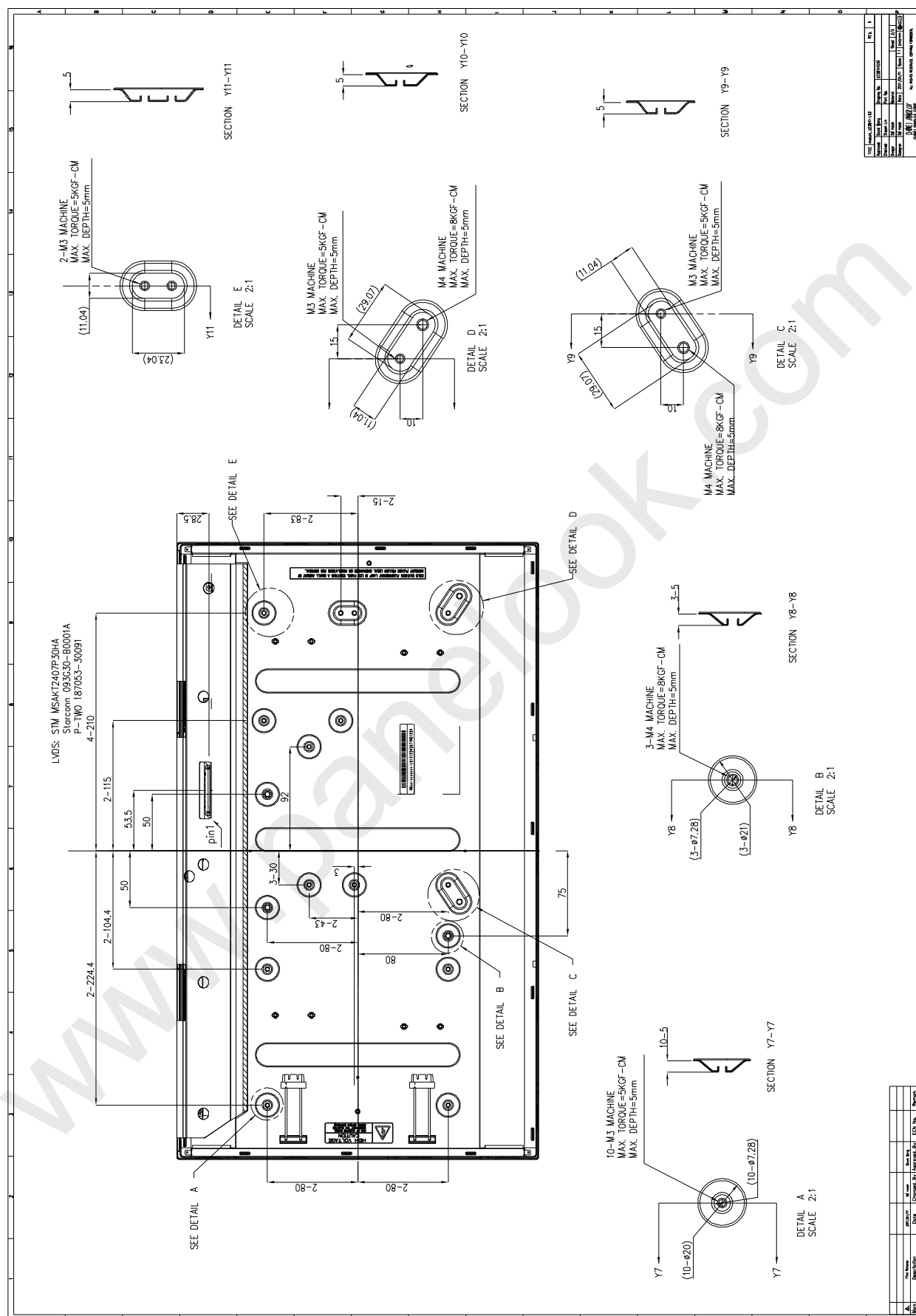
Figure 10-2 packing method

11. MECHANICAL CHARACTERISTIC



奇美電子
CHIMEI INNOLUX

PRODUCT SPECIFICATION



Version 2.0

33

Date : 03 Jun 2011

The copyright belongs to CHIMEI InnoLux. Any unauthorized use is prohibited

One step solution for LCD / PDP / OLED panel application: Datasheet, inventory and accessory! www.panelook.com

PRODUCT SPECIFICATION

